

**REMARKS**

Applicants respectfully acknowledge receipt of the Office Action mailed February 21, 2008.

In the Office Action, the Examiner rejected claims 19, 20, 22, 23, 25, and 26 under 35 U.S.C. § 103(a) as being unpatentable over *Wang et al.* (U.S. Patent No. 6,787,054) in view of *Koshimizu* (U.S. Patent No. 6,162,323) and *Brown et al.* (U.S. Patent Pub. No. 2002/0066535); rejected claims 21, 28, and 29 under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Koshimizu* and *Brown*, and further in view of *Takagi et al.* (U.S. Patent No. 6,402,847); rejected claims 24 and 27 under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Koshimizu* and *Brown*, and further in view of *Shen et al.* (U.S. Patent No. 6,797,188); and rejected claim 30 under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Koshimizu*, *Brown*, and *Takagi*, and further in view of *Shen*.

No claim is amended herein, and claims 19-30 remain pending. Of these claims, claim 19 is independent.

Applicants traverse the rejections above and respectfully request reconsideration for at least the reasons that follow.

**I. 35 U.S.C. § 103(a) REJECTIONS**

Claims 19, 20, 22, 23, 25, and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Koshimizu* and *Brown*. Applicants respectfully disagree with the Examiner's arguments and conclusions and submit that independent claim 19 is patentably distinguishable over *Wang*, *Koshimizu*, and *Brown* at least for the reasons set forth below.

The key to supporting any rejection under 35 U.S.C. § 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. See M.P.E.P. § 2142, 8th Ed., Rev. 6 (Sept. 2007). Such an analysis should be made explicit and cannot be premised upon mere conclusory statements. See id. “A conclusion of obviousness requires that the reference(s) relied upon be enabling in that it put the public in possession of the claimed invention.” M.P.E.P. § 2145. Furthermore, “[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art” at the time the invention was made. M.P.E.P. § 2143.01(III), internal citation omitted. Moreover, “[i]n determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.” M.P.E.P. § 2141.02(I), internal citations omitted (emphasis in original).

“[T]he framework for the objective analysis for determining obviousness under 35 U.S.C. 103 is stated in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). . . . The factual inquiries . . . [include determining the scope and content of the prior art and] . . . [a]scertaining the differences between the claimed invention and the prior art.” M.P.E.P. § 2141(II). “Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art.” M.P.E.P. § 2141(III).

*Wang* appears to disclose a two-stage etching process for etching a substrate and removing etch residue deposited on surfaces in an etching chamber. (*Wang*,

Abstract). Process gas is introduced into a chamber 105 through a gas distribution system 130 that includes a process gas supply 135 and a gas flow control system. The gas distribution system 130 can comprise gas outlets 150 located peripherally around a substrate 25. The gas distribution system 130 may further comprise a second gas supply 155 which provides cleaning gas to the chamber 105. (*Id.* at col. 5, ll. 9-18).

As admitted by the Examiner, however, “Wang et al do not teach a second exhaust port that is positioned lower than the first exhaust port.” (*Office Action*, p. 4, line 1). Moreover, *Wang* fails to disclose introducing, after said substrate is plasma-processed, a cleaning gas into said process chamber while the inside of said process chamber is evacuated. Rather, as disclosed in col. 5, lines 19-20 of *Wang*, “the process gas and the cleaning gas can be premixed and delivered together to the process chamber.” The cleaning gas is not delivered into the process chamber while the inside of the process chamber is evacuated.

Accordingly, in order to cure the deficiencies of *Wang*, the Examiner relies on *Koshimizu* and asserts that “*Koshimizu* teaches a plasma processing method comprising . . . [a] first exhaust line with exhaust port 608 positioned higher than substrate surface and second exhaust line with second exhaust port 602 . . .” (*Office Action*, p. 4, ll. 2-6). Such teaching, even if present in *Koshimizu*, which Applicants do not necessarily concede, however, fails to teach or suggest, “introducing, after [a] substrate is plasma-processed, a cleaning gas into [a] process chamber while the inside of said process chamber is evacuated by a second exhaust port positioned lower than [a] first exhaust port in said process chamber,” as recited in claim 19. In fact, as admitted by the Examiner, “*Wang* et al in view of *Koshimizu* teach second exhaust port

but do not teach that the second exhaust port is positioned lower than the first exhaust port." (*Office Action*, p. 4, ll. 11-12).

Accordingly, in order to cure the deficiencies of *Wang* and *Koshimizu*, the Examiner relies on *Brown* and alleges that "Brown et al teach . . . a plasma processing method including [an] apparatus comprising a process chamber 25 having an exhaust port in the bottom wall of the process chamber and having an exhaust pipe 85 with an exhaust throttle valve attached thereto. . ." (*Office Action*, p. 4, ll. 13-15). Such teaching, even if present in *Brown*, which Applicants do not concede, however, fails to teach or suggest, "introducing, after [a] substrate is plasma-processed, a cleaning gas into [a] process chamber while the inside of said process chamber is evacuated by a second exhaust port positioned lower than [a] first exhaust port in said process chamber," as recited in claim 19.

*Brown* appears to disclose a process chamber 25 for processing a substrate 35 in process gas and reducing emissions of hazardous gas to the environment. A gas treatment apparatus 75 is provided to treat and exhaust an effluent from the process chamber 25. The gas treatment apparatus 75 comprises an exhaust system having an exhaust tube 85, and a gas energizer 90 for energizing the effluent in the exhaust tube 85 by microwaves or by RF energy. (*Brown*, Abstract). The exhaust tube 85, which the Examiner asserts is analogous to the claimed "second exhaust port," however, does not exhaust a cleaning gas. Rather, the exhaust tube 85 exhausts the spent process gas and etchant byproducts.

As disclosed in Applicants' specification at page 11, line 24 - page 12, line 15, "the inside of the process chamber 110 is exhausted through the first exhaust port 105

... , and the cleaning gas is ejected from the holes 121a of the shower plate 121 . . .

[and] [a]t this time, the inside of the process chamber 110 is exhausted through the second exhaust port 106."

Accordingly, with respect to independent claim 19, *Wang, Koshimizu, and Brown* fail to teach Applicants' claimed combination, including, *inter alia*:

introducing, after [a] substrate is plasma-processed, a cleaning gas into [a] process chamber while the inside of said process chamber is evacuated by a second exhaust port positioned lower than [a] first exhaust port in said process chamber.

As explained above, the elements of independent claim 19 are neither taught nor suggested by the cited references. Consequently, the Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the claimed invention. Accordingly, no reason has been clearly articulated as to why the claims would have been obvious to one of ordinary skill in view of the prior art. Therefore, a *prima facie* case of obviousness has not been established for independent claim 19, and claims 20, 22, 23, 25, and 26, which depend from claim 19. Claims 19, 20, 22, 23, 25, and 26 are therefore patentable over *Wang, Koshimizu, and Brown*. Applicants request that the rejection of claims 19, 20, 22, 23, 25, and 26 under 35 U.S.C. § 103(a) be withdrawn.

Claims 21, 28, and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Koshimizu* and *Brown*, and further in view of *Takagi*; claims 24 and 27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Koshimizu* and *Brown*, and further in view of *Shen*; and claim 30 stands

rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Koshimizu, Brown, and Takagi*, and further in view of *Shen*. The shortcomings of *Wang, Koshimizu, and Brown* are discussed above.

With respect to *Takagi*, the Examiner alleges, “*Takagi et al* teach a plasma processing method including a processing chamber 1 where the substrate is movable up/down during etching and cleaning operations. . . *Takagi et al* also teach that during processing the first exhaust port is positioned higher than the surface of the substrate . . .” (*Office Action*, page 5, line 22 - page 6, line 8); and with respect to *Shen*, the Examiner asserts “*Shen et al* teach a plasma cleaning method for cleaning a process chamber and where either RF or microwave energy can be used . . .” (*Id.* at p. 7, ll. 3-4). Such teachings, even if present in *Takagi* and *Shen*, however, fail to teach or suggest, at least, “introducing, after [a] substrate is plasma-processed, a cleaning gas into [a] process chamber while the inside of said process chamber is evacuated by a second exhaust port positioned lower than [a] first exhaust port in said process chamber,” as recited in independent claim 19. Thus, claims 21, 24, and 27-30 are allowable at least due to their dependence from independent claim 19.

## II. CONCLUSION

Applicants respectfully submit that independent claim 19 is in condition for allowance. In addition, claims 20-30 are in condition for allowance at least due to their dependence from independent claim 19.

The Office Action contains characterizations of the claims and the related art with which Applicants do not necessarily agree. Unless expressly noted otherwise, Applicants decline to subscribe to any statement or characterization in the Office Action.

In view of the foregoing remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: August 11, 2008

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